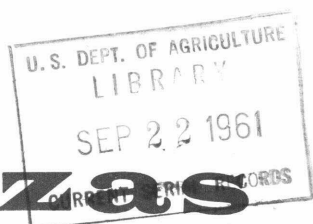


Historic, archived document

Do not assume content reflects current
scientific knowledge, policies, or
practices.

1
Ag84F
cop. 2

Annual Lespedeza



**Culture
and
Use**

Farmers' Bulletin No. 2113
UNITED STATES DEPARTMENT OF AGRICULTURE

The annual lespedezas are of major importance in the eastern half of the United States as a crop for midsummer and late summer grazing, for soil improvement, and for hay and seed. The first census reporting lespedeza acreage for hay and seed covered the 1924 crop and reported an acreage of 353,000 acres. Between 1943 and 1952, the yearly average was over 7 million acres. However, lespedeza volunteers on a much larger acreage in winter grain and in permanent pasture.

Common lespedeza has been grown to a limited extent for hay, pasturage, and soil improvement in some of the Southern States for many years. The introduction of Korean and Kobe lespedezas and the development of Iowa 6, Rowan, and Climax varieties of Korean have increased the use of the crop in localities where it was already grown and have extended the lespedeza region to other States to the north and west.

Contents

	Page
Striate varieties	3
Korean varieties	4
Soil and fertilizer requirements	5
Inoculation	6
Seeding	6
Hay	7
Pasture	8
Harvesting for seed	9
Soil improvement and erosion control	9
Cropping systems	11
Insect pests	13
Weeds	15
Diseases	15

This bulletin supersedes Farmers' Bulletin 1852,
Lespedeza: Culture and Utilization, and Leaflet 240,
Kobe, A Superior Lespedeza.

Washington, D. C.

Issued April 1958

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 10 cents

Annual Lespedezas

Culture and Use

By P. R. HENSON and C. H. HANSON, research agronomists, Crops Research Division, Agricultural Research Service

There are only two species of annual lespedeza and both are of interest to the American farmer. The species, both of Asiatic origin, are *Lespedeza striata* (striate) and *L. stipulacea* (Korean).

The species are similar but can be readily distinguished. Korean lespedeza is a larger, coarser, and earlier maturing plant than is striate lespedeza and has broader leaflets and larger bracts, or stipules, at the base of the leaves. At maturity the leaves of the Korean turn forward so that the tips of the branches resemble small cones, but the leaves of striate lespedeza do not turn forward. The hairs on the stems of Korean lespedeza point upward; those of striate lespedeza point downward.

Varieties of each species have been developed and are now in commercial production. The principal varieties are as follows:

Striate: Common, Kobe.

Korean: Iowa 6, Rowan, Climax.

Striate varieties

Common and Kobe lespedezas are well adapted across the Lower South (fig. 1). Striate lespedeza was first reported in Georgia in 1846. Since it came from Japan, it was called Japan clover; later it became known as Common lespedeza.

Common lespedeza is a slender plant with small leaflets and purple

flowers. It is prostrate in growth except in dense stands. Because of its habit of growth, it is sometimes preferred in permanent pastures in the Deep South. It is smaller growing and generally less productive than Kobe. It is a poor seed producer, and seed stocks are limited.

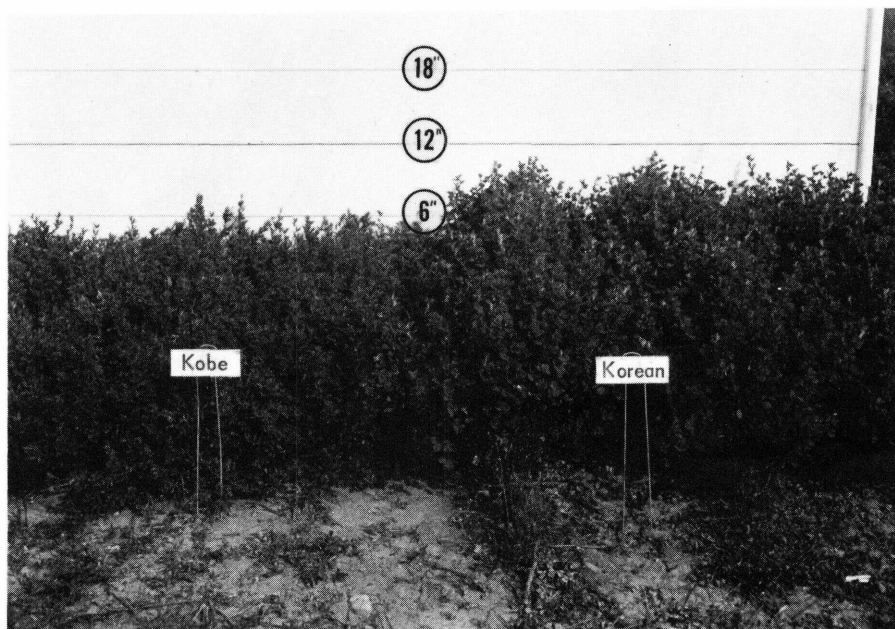
Kobe was introduced from Japan in 1919 by an explorer of the U. S. Department of Agriculture. It is larger and coarser than Common lespedeza.

Kobe is more erect in habit of growth and is more productive for hay and pasture than Common.



BN-4668

Figure 1.—Region of the United States to which Common and Kobe lespedezas are well adapted.



BN-4632

Figure 2.—Lepedeza at Beltsville, Md., in late July: Korean, right, shows greater growth than Kobe.

It is slower in starting growth in the spring than the Korean varieties (fig. 2); however, late summer yields are usually good. Since about 1945, slightly more than 20 percent of the total lespedeza seed harvest has been of the Kobe variety.

Korean varieties

Iowa 6 is an early-maturing variety of Korean lespedeza developed by the Iowa Agricultural Experiment Station. Because of its earlier maturity, it is well adapted across the upper part of the Korean area (fig. 3) and extends the lespedeza area farther north. Iowa 6 carries some resistance to lespedeza wilt and grows off rapidly in the spring (fig. 4). This variety yields well in the Korean area and appears promising where an early variety is

needed to reseed before winter grain is sown.

Rowan, released in 1951, was developed in a cooperative program by the North Carolina Agricultural Experiment Station and the U. S. Department of Agriculture. It is intermediate in maturity between Iowa 6 and Climax. It is moderately resistant to two common nematode species and to powdery mildew. It is decidedly more productive than other Korean varieties on nematode-infested soils. The difference in growth between Rowan and Kobe at Beltsville, Md., is shown in figure 5.

Climax is a selection from a plant introduction¹ from China. It has been evaluated in a cooperative program conducted by the State agricultural experiment stations of the lespedeza region and the U. S.

¹ P. I. 116138.

Department of Agriculture. It carries some resistance to bacterial wilt of lespedeza. It matures earlier than Kobe but is about 10 days later than Rowan. The approximate area to which it is adapted is shown in figure 3.

Soil and fertilizer requirements

Lepedeza will grow on almost any type of soil. It does well on the sandy loam soils of the Coastal Plain, the clay soils of the Piedmont, and the limestone soils of Virginia, Tennessee, and Kentucky. It will grow on soils too acid to grow clover. It does better on good land and makes its best growth on fertile, bottom land, where yields of 2 to 3 tons of hay per acre are not uncommon.

On very acid soil lime has proved very beneficial to lespedeza. The Korean lespedezas are more responsive to lime than the Common

variety of striate lespedeza. Where soils are poor, lespedeza will respond to both lime and fertilizers. Phosphate in particular has caused increased yields and should be used generally on all the poorer soil. In the Coastal Plain, both phosphate and potash are generally needed, and 200 to 400 pounds per acre of an 0-14-14 fertilizer is recommended.

The amount of fertilizer that should be used depends to some extent on the amount of fertilizer that was applied to the crop preceding the lespedeza in the rotation and on the management of the lespedeza in the rotation. Where lespedeza is grown each year with winter grains and harvested for hay, the available supply of phosphate and potash may be exhausted unless particular attention is paid to the fertility requirements of the crop.

Although lespedezas are fairly drought resistant, good yields depend on an adequate moisture supply.

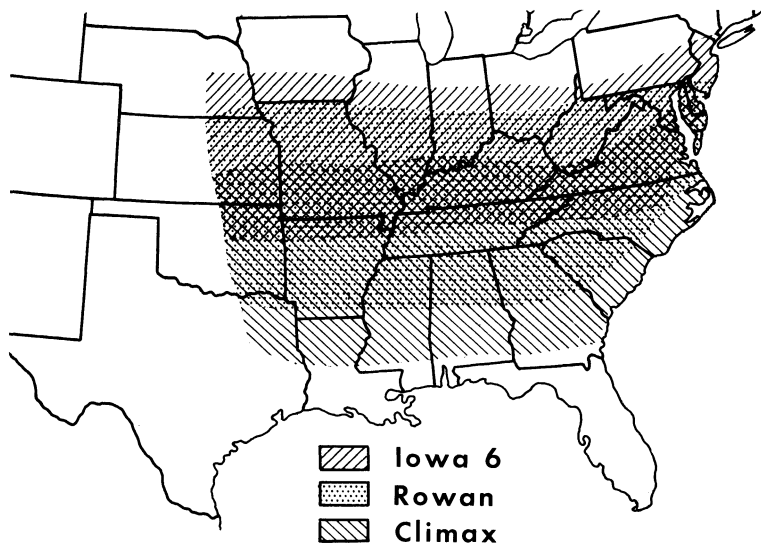
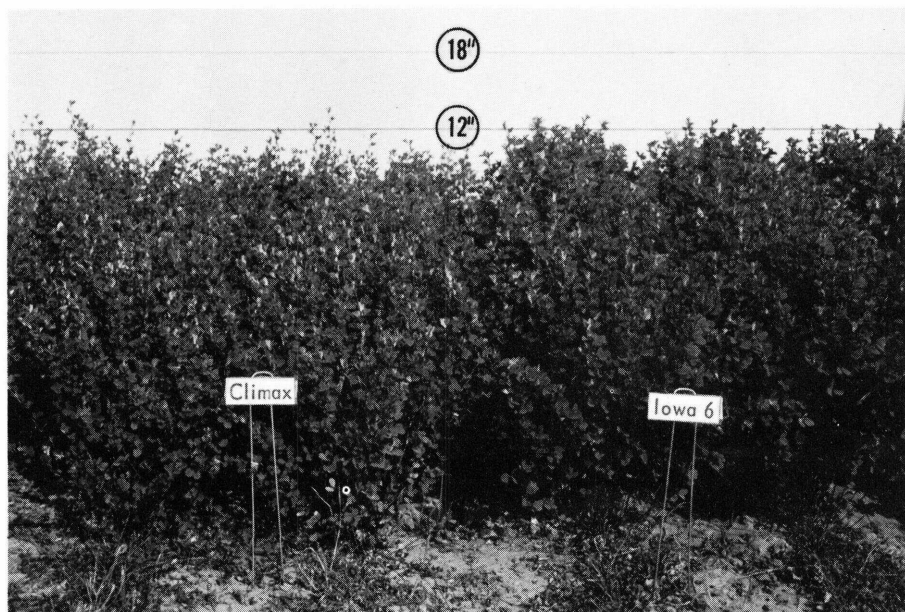


Figure 3.—Approximate areas of adaptation of Korean varieties of lespedeza.

BN-4873



BN-4631

Figure 4.—Lepedeza at Beltsville, Md., in late July: Iowa 6, right, shows greater growth than Climax.

Inoculation

In the region where lespedeza is commonly grown, inoculation is generally not needed. On badly eroded soils it may be beneficial or necessary. On land that has not previously grown lespedeza, inoculation is necessary the first year. Inoculation with commercial cultures is more helpful in plantings north of the Ohio River than farther south. This is particularly true of Korean lespedeza.

Seeding

Time and rate

In North Carolina, Tennessee, and farther south, annual lespedezas should be seeded in late February or the first half of March. Farther north, seeding should be

delayed until late March or early April.

The Korean varieties and Common lespedeza should be seeded at the rate of 25 to 30 pounds of seed per acre and Kobe at the rate of 30 to 40 pounds. Fifteen pounds of the Korean varieties and of Common and 15 to 20 pounds of Kobe per acre are sown when lespedeza is included in a pasture mixture.

Method

The seed of the annual lespedezas should be sown broadcast or drilled alone or on winter grain. If broadcast seeding is done too late or if the ground is too hard for freezing and thawing to work the seed under the surface, the field should be lightly harrowed after seeding. Freshly prepared land or loose seedbeds should be rolled or otherwise firmed. A firm seedbed is essential in obtaining a good stand.

When annual lespedezas are seeded on meadows or pastures, a spring-tooth harrow or disk should be used to loosen the surface soil before the seed is sown. This will do much to insure a stand.

Hay

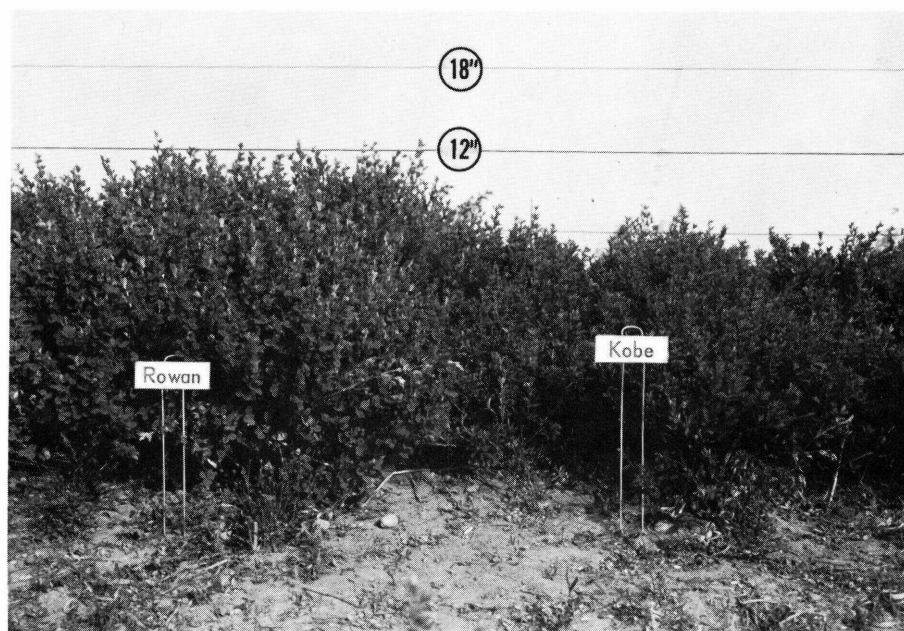
An average yield of hay for the annual lespedezas is about 1 ton per acre. On good soils 2 to 3 tons may be expected.

Cutting

The best hay is made by cutting the annual lespedezas in first bloom or just before first bloom. In the latitude of North Carolina this will usually be the first half of August for the Korean varieties and about 2 weeks later for the striate varieties. When lespedeza is left until a considerable part of the seed is ripe, the hay is of poorer grade.

Lepedeza contains less moisture than alfalfa or red clover and is consequently more quickly cured. The field-cured hay contains somewhat more dry matter than field-cured alfalfa or clover hay. Annual lespedeza that is cut when no more than 10 inches high should be windrowed soon after cutting and in good weather may be hauled to the barn in 24 hours. If cut early in the morning it can be stacked late the same day. If it is more than 15 inches high when cut, the hay should lie in the swath longer. In the southern part of the lespedeza region, a seed crop of the annual lespedezas may be produced after harvesting a very early hay crop.

If a volunteer stand of annual lespedeza is desired the following year, the hay must be cut early (about first bloom) and high enough for the second growth to have time to produce seed; or the cutting must be delayed until part of the seed has matured sufficiently to



BN-4633

Figure 5.—Lepedeza at Beltsville, Md., in late July: Rowan, left, shows greater growth than Kobe.

shatter while the hay is being cut. The latter practice, however, will result in poor hay.

Feeding value

Each year between 1943 and 1952, American farmers produced over 6 million tons of lespedeza hay. Feeding trials indicate that annual lespedeza hay is nearly equal in quality to alfalfa hay. Chemical analyses show that the protein and mineral content of lespedeza hay varies with the stage of maturity at which it is cut and with the fertility or composition of the soil on which it is grown. The maturity of annual lespedeza hay markedly affects its nutritive value.

In tests at the Tennessee Agricultural Experiment Station, hay cut when in bloom was more palatable and resulted in greater milk production than late-cut hay. It was also found that large quantities of foreign material, such as straw and weeds, reduces the nutritive value of lespedeza hay. Tests with milk cows showed that 4 tons of U. S. No. 3 lespedeza hay containing 18.3 percent of foreign material is equal to 5 tons of lespedeza hay of which one-third is foreign material.

Pasture

The annual lespedezas are primarily pasture plants that afford good grazing in both temporary and permanent pastures. They make their best growth in the summer and provide excellent grazing during this period. This is often the time that Ladino and other white clover pastures are low in production and forage is needed.

The lespedezas start growth slowly in the spring and are of little value for early grazing. Iowa 6 is ready to graze a week ahead of Rowan and Korean. Climax, Kobe, and Com-

mon provide progressively later initial grazing. Grazing begins in June or July, depending on the location, and may continue until frost.

Maximum production from lespedeza is obtained if it is seeded in late winter or early spring in winter oats, winter wheat, rye, or barley. Winter grain may be grazed off completely, or the grazing animals may be removed in February or March in order to produce a grain crop. Lespedeza seeded in the grain crop is ready for grazing shortly after the grain is combined. The pastures can be renewed by disking the land in the fall after the lespedeza seed has matured, again drilling in the small grain, and allowing the lespedeza to volunteer. High rates of nitrogen fertilization of the small grain, however, may crowd out the lespedeza.

In the region to which lespedeza is adapted, annual lespedeza may be included in any grass-legume mixture for permanent pasture. In areas where orchardgrass and Korean lespedeza are adapted, the seeded mixtures will give good, season-long grazing with limited fertilizer applications. Annual lespedezas are often included in rotation pasture mixtures containing orchardgrass and Ladino clover to balance the mixture, and they may help to reduce bloat hazards.

The annual lespedezas can be maintained well with grasses that do not form a dense sod. Grasses that make a heavy, matted growth, such as carpetgrass and Bermuda-grass, crowd out the lespedeza almost completely in the second season. (Bermudagrass offers less competition than carpetgrass.) Such pastures usually must be plowed or otherwise renovated every third year if lespedeza is to be maintained. The use of phosphate with a lespedeza-grass mixture helps maintain the stand of lespedeza. In a perennial grass pasture, close grazing in spring is advised to assist the young

lespedeza plants to become well established.

When annual lespedeza is seeded with a grain crop and the grain is harvested for seed, the lespedeza, which grows rapidly after the grain harvest, can be used as summer pasture to supplement the regular pasture during the summer period of short growth. In this way overgrazing of permanent pastures can be avoided.

Since the seed and leaves of Korean lespedeza remain on the plant well into the winter, this variety provides late grazing. Livestock readily eat the dried leaves and seed.

Harvesting for seed

Lespedeza is harvested for seed throughout the region in which it is grown. Depending on latitude, Common, Kobe, and Climax mature from October to November; and Iowa 6, Rowan, and Korean from September to October.

The seed of all varieties shatter. Seed of the striate varieties, Common and Kobe, shatter more readily than Korean. Maximum yields of any of the varieties can be obtained only by harvesting the seed very soon after maturity. Studies have shown that 50 percent of the seed may be lost from shattering if harvesting is delayed 2 or 3 weeks after the plants are ripe.

The seed is ordinarily harvested with a combine, with most of the acreage being combined direct. As soon as most of the seed is mature, the lespedeza may be mowed and windrowed while still tough with dew. After curing in the windrow, it can be threshed from the combine with pickup attachments.

If harvested too early, much of the seed will be immature. Early harvested seed may contain green leaves, stems, and other trash that is high in moisture content. Such

seed should be cleaned immediately or spread out to dry. When a killing frost occurs before the crop has ripened sufficiently, the seed should be harvested as soon as possible to avoid excessive shattering.

Seed yields of the striate varieties are usually 100 to 250 pounds per acre. The Korean varieties average around 300 pounds per acre. Seed yields of over 1,000 pounds per acre have been reported for Korean, and approximately 70 percent of the total lespedeza seed crop harvested is from Korean varieties.

The seed from the combine must be recleaned to take out the seeds of such weeds as ragweed, poverty-weed, and dodder. Dodder seed is about the same size as that of lespedeza, with the exception of Kobe, which is larger. Unbroken pods of dodder are easily cleaned out in other trash. In threshed samples, many pods of dodder are broken, and the screens must be carefully adjusted to remove all or nearly all of the dodder. It is often extremely difficult to remove enough of the dodder to bring the seed up to State certification standards.

Soil improvement and erosion control

Because lespedeza grows in thick stands, it affords an excellent cover throughout the growing season for the prevention of erosion. Lespedeza grown alone or with a grain crop protects the soil from eroding rains from summer to early fall.

It increases soil fertility by adding nitrogen and organic matter. Its use for this purpose is strongly recommended. If it is allowed to remain on the land without being cut, maximum benefit to soil fertility is obtained, but even when the crop is harvested for hay or seed or is used as pasturage, it increases yields.

When a full growth of lespedeza is worked into the soil it greatly increases the yield of the following crop and influences the yield of succeeding crops for several years.

Loss from erosion and decline in productivity of soils is greater in the southeastern part of the United States than elsewhere. Here the lespedezas are especially useful. The annual lespedezas grow slowly in the spring, but during the summer they cover and protect the soil, and the stubble and debris help to prevent erosion during the winter. However, a winter-growing crop, which prevents loss of plant food by leaching, should follow the lespedeza.

For soil improvement and erosion control, lespedeza may be fitted into the farm program in various ways. In areas where acreages of cash crops such as cotton and wheat are being reduced, annual lespedezas can be maintained at little cost. Seeding annual lespedeza on small-grain strips that alternate with corn or cotton will prevent excessive soil wash. The small grain protects the soil during the winter, the lespedeza during the summer. The strips should be moved every 2 or 3 years.

Rolling fields may be kept in annual lespedeza for several years and the lespedeza used for hay, grazing, or seed. A winter-growing grass should be seeded in mixture with the lespedeza, or a winter grain seeded following the lespedeza crop. This will insure against leaching and prevent erosion when the crop is cut or very closely grazed.

Continuous cropping to lespedeza reduces phosphorus in the soil, and the addition of phosphorus as a fertilizer is necessary to insure good yields. After 2 or 3 years the lespedeza field will have a higher productivity and may then be used for cultivated crops. Under a cover of lespedeza little soil loss will occur.

Value for Wildlife

The seed of lespedeza furnishes an abundance of feed for birds, and the annual species are grazed by deer and other wild animals. As a honey plant, annual lespedeza has little value.

Leaflet 373, *Lespedezas for Quail and Good Land Use*, may be obtained from the U. S. Department of Agriculture, Washington 25, D. C.

The annual lespedezas fit well into 1-year grain-lespedeza rotations. After the lespedeza has been grazed or cut for seed, the field should be well disked and sown to winter grain with a drill. The lespedeza will volunteer from year to year and check erosion. Iowa 6 and Rowan are best adapted to this rotation. If desired, the rotation may be extended 2 or 3 or more years.

If spring oats are alternated with lespedeza, the later-maturing varieties of annual lespedezas may be used. Late in winter the old lespedeza debris should be disked and an early variety of oats drilled in.

When cultivated crops must be raised, they should be grown in rotation with erosion-resisting crops. The annual lespedezas are well suited for this purpose. For example, corn can be followed by oats with lespedeza in the oats. In the fall the lespedeza should be disked and the land sown to wheat. The lespedeza is then allowed to volunteer the next season.

Where crimson clover does well as a winter crop, it may be drilled in the disked lespedeza and the winter growth turned under in the spring for corn. Where crimson

clover is not successful, hairy or woollypod vetch or Austrian Winter or Romack peas may be used.

Other rotations with corn or cotton may be arranged, because an annual lespedeza fits in more readily than any other legume.

For soil improvement and erosion control over a period of years, the annual lespedezas are less desirable than the perennial lespedeza, sericea. However, if the annual lespedezas are used for this purpose, a winter annual grass such as Italian ryegrass or rescuegrass fits in well with them. These grasses grow in winter and protect the soil. In the spring they give way to annual lespedeza and some of them will produce seed for a volunteer crop the following winter. This makes an excellent grazing and soil-protecting combination.

Small gullies can be healed and further erosion checked by seeding annual lespedeza. Roadbanks and shoulders can be covered and held by lespedeza, which not only offers a good appearance but prevents washing. Grass in combination with the lespedeza can often be used to advantage.

When a summer crop is needed for the addition of organic matter and for soil improvement in orchards, the annual lespedezas can often be used for this purpose.

Cropping systems

One of the small grains is included in a great many cropping systems used in southern Iowa and in the regions in the South and East. In such cropping systems, lespedeza nearly always follows the small grain and precedes an intertilled crop such as cotton or corn.

In cropping systems that do not include a small grain, lespedeza follows an intertilled crop and occupies the land 1 or 2 years. Lespedeza may be cut for hay or

seed during this time. Across the northern edge of the Korean belt, Iowa 6 matures seed in time to permit a fall-sown crop to be planted the same year. Farther south a fall-sown crop can also follow late-maturing varieties when they are cut for hay or used for pasture.

A field can be seeded to lespedeza in the spring, and a crop of hay or seed harvested the same year. The land is then turned for the next crop, or the lespedeza is allowed to volunteer for hay or seed the second year.

The place that lespedeza occupies in the cropping system and the use made of the crop vary with the type of farming. The cotton grower located on a sandy loam soil usually employs a slightly different cropping system from that employed by the cotton grower on a clay soil. Both systems may be different from those in use on grain and livestock farms.

Few, if any, changes in the crop sequence are necessary when lespedeza is added to the cropping system. In many rotations lespedeza either takes the place of grass and clover or is grown with them. Where the soil and climatic conditions are unfavorable for producing clover and grass, but favorable to lespedeza, lespedeza can be grown to supply the nitrogen and organic matter necessary to maintain soil fertility and round out the rotation. Sometimes a small grain—usually oats—is added to the cropping system, because a crop of oats and a crop of lespedeza can be grown on the land the same year without an extra plowing.

The rotations outlined below show how lespedeza fits in with some of the other crops usually grown in the area mentioned. Most of these rotations can be improved by adding a winter cover crop to increase soil fertility and decrease erosion and leaching. The use of

a winter cover crop whenever possible is recommended. Usually it can be added without otherwise altering the rotation.

The following 3-year rotation is used on farms where cotton is an important crop and wheat does not yield well:

First year, cotton or corn.
Second year, oats, seeded to lespedeza.
Third year, volunteer lespedeza.

Winter legumes such as hairy, woollypod, or common vetch or crimson clover should follow the volunteering lespedeza crop. The winter legume should be plowed under preceding the corn or cotton crop.

The acreage of oats in this rotation is the same as the combined acreage of cotton and corn, since oats follow both these crops.

The second year of this rotation provides a crop of oats for hay or grain and a crop of lespedeza hay or seed. The lespedeza can be left to volunteer for the third year of the rotation, or the land can be turned for the next crop. The usual practice is to let the lespedeza volunteer 1 or 2 years. Where cotton is grown only on certain fields of the farm because of a difference in soil conditions, two rotations are used—one for cotton and another for corn.

Where the soil is sufficiently uniform and adapted to the production of wheat and oats as well as cotton and corn, one of the following 3-year rotations can be used:

First year, cotton or corn.
Second year, wheat seeded to lespedeza.
Third year, oats, seeded to lespedeza.

First year, corn.
Second year, cotton.
Third year, wheat or oats, seeded to lespedeza.

Again, in the first rotation, winter legumes should follow lespedeza the third year. In the second rotation, winter legumes should follow the corn the first year and the lespedeza the third year.

Each of these rotations can be lengthened by allowing the lespedeza to volunteer 1 or more years.

Another 3-year rotation, used mainly on sandy loam soils adapted to the production of peanuts as well as cotton, follows:

First year, cotton.
Second year, peanuts.
Third year, small grain seeded to lespedeza.

Lupines, winter peas, or vetch may be planted in the fall after lespedeza, to be turned under as a soil-improving crop preceding cotton. Lupines have been particularly productive in southern Alabama, Georgia, and northern Florida.

Lupines or small grains (winter oats or rye) are seeded by hand on the peanut field just before the peanuts are dug. After the peanuts are stacked, the land is harrowed to level the surface and cover any of the seed not covered by the digging operation.

The following 4-year rotation can be used where dairying is important:

First year, cotton.
Second year, winter oats and vetch seeded to lespedeza.
Third year, corn.
Fourth year, wheat seeded to lespedeza.

Following lespedeza in the second year, vetch, crimson clover, or a mixture of the legumes with small grains may be seeded to provide winter grazing if needed, or to improve the soil for the third-year corn crop. A similar planting is suggested after lespedeza the fourth year.

This rotation provides hay and grain for the dairy cows and two cash crops. A legume is grown on 3 of the 4 fields each year.

The following 4-year rotation of corn, wheat, oats, and hay—in use on many farms where livestock production is an important enterprise—can be considerably improved by adding lespedeza:

First year, corn.
Second year, wheat.
Third year, oats seeded to grass and clover.
Fourth year, grass and clover.

Note that grass and clover do not follow the wheat, because the wheat stubble must be turned for the oats. This does not allow sufficient time for the grass and clover to become established before the field is prepared for oats. The grass and clover following the oats may produce a light crop of hay if the season is favorable. The same rotation with lespedeza follows:

First year, corn.
Second year, wheat seeded to lespedeza.
Third year, oats seeded to grass and lespedeza.
Fourth year, hay or pasture.

The lespedeza seeded on the wheat produces a crop of hay or seed, and the grass and lespedeza seeded on the oats produce a crop of lespedeza hay or pasturage. The fourth year of the rotation a crop of grass hay and a crop of lespedeza hay or pasture are produced. The grass will provide early grazing and carry the animals until the lespedeza has made sufficient growth to carry them the rest of the season.

Where the soil is well adapted to wheat, the 5-year rotation of corn, wheat 2 years, hay, and pasture has long been in use on grain and livestock farms. The following plan shows this rotation with lespedeza in place of grass and clover:

First year, corn.
Second year, wheat seeded to lespedeza.
Third year, wheat, volunteer lespedeza.
Fourth year, lespedeza.
Fifth year, lespedeza.

The cornland is disked and harrowed in the fall before the wheat is sown. Lespedeza is sown broadcast on the wheat in March. After the wheat is harvested the lespedeza produces a crop of hay or seed.

The stubble is then disked and again seeded to wheat. A Korean variety of lespedeza reseeds the

land, and a volunteer crop follows the second-year wheat. The fourth and fifth years of the rotation also provide for volunteer lespedeza, which is used for hay, pasture, or seed. A crop of corn, 2 crops of wheat, and 4 crops of lespedeza are produced with one plowing.

With taller-growing varieties of small grain and higher rates of fertilization for the grain, it may be difficult to obtain good stands of lespedeza when spring and early summer rainfall is low. In areas where moisture is critical at this time of the year, fertilizing the small grain at moderate rates may be necessary to obtain a stand of lespedeza.

Insect pests²

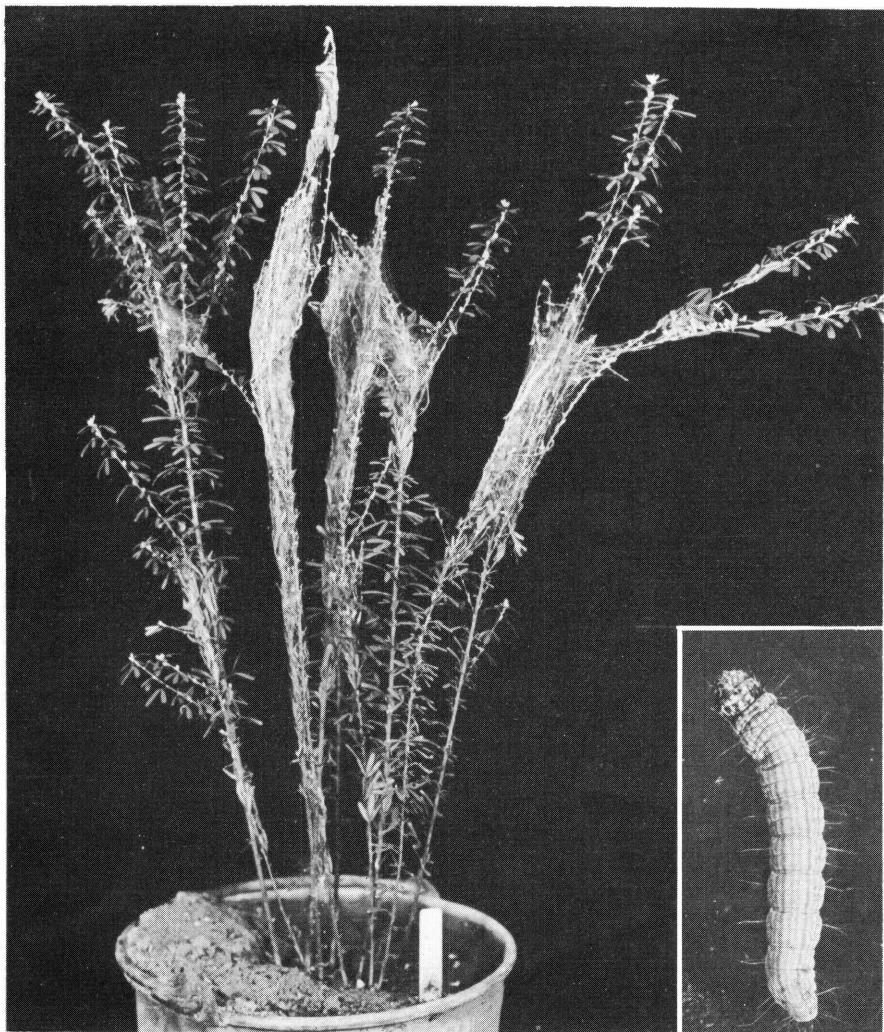
Grasshoppers frequently feed on the leaves and stems of lespedeza plants. In the Southeastern States the American grasshopper (*Schistocerca americana*) is usually the most injurious species.

To control grasshoppers on lespedeza grown for seed or for soil conservation, apply one of the following insecticides in a spray, at the per-acre rate indicated: Aldrin, 2 ounces, or heptachlor, 2 to 4 ounces. If you prefer to use a dust, increase the dosage by 50 percent.

You can buy these insecticides as ready-mixed dusts or you can buy them as emulsifiable concentrates or wettable powders, which are diluted with water for use as sprays. In preparing a spray, dilute the insecticide to suit available spraying equipment.

To control grasshoppers on lespedeza that is used for pasture or cut for forage, apply methoxychlor at the rate of 3 pounds per acre. Do not feed or allow animals to graze on lespedeza treated with

² Contributed by the Entomology Research Division, Agricultural Research Service.



C & F-5933, C & F-5936

Figure 6.—Lespedeza webworm and its webs on a lespedeza plant.

methoxychlor for 7 days after application.

In some years the armyworm (*Pseudaletia unipuncta*) and the fall armyworm (*Laphygma frugiperda*) cause serious and widespread damage to lespedeza. These worms prefer to feed on grasses, both wild and cultivated, but during outbreaks they will eat many other crops. The nearly full-grown caterpillars have enormous appetites and

can strip the plants within a short time. Apply control measures as early as possible. For information on the control of these worms, consult Farmers' Bulletin 1850, The Armyworm and Its Control, and Farmers' Bulletin 1990, Habits and Control of the Fall Armyworm.

In the Southern States the three-cornered alfalfa hopper (*Spissistilus festinus*) at times damages lespedeza severely. Both adults and nymphs

weaken the plants by sucking the juices. They also girdle the stems with feeding punctures, which later form hard galls, and the injured plants are retarded in growth and break off. Cut badly infested fields for hay as early as practicable. Insecticides have not given satisfactory control of this insect.

The lespedeza webworm (*Tetralopha scortealis*) defoliates the plants and reduces seed production. It occurs from Maryland to Florida, and in some seasons outbreaks of the web-forming caterpillars (fig. 6) have caused much concern. The leaf tier (*Archips obsoletana*) also infests lespedeza. The larvae produce a webbing similar to that of the lespedeza webworm. Specific control for these insects has not been worked out.

In the Southeastern States, white-fringed beetles (*Graphognathus leucoloma*) sometimes feed on lespedeza. Japanese beetles (*Popillia japonica*) may partially defoliate plantings in Maryland and Virginia. For information on the control of these insects, consult Leaflet 401, The White-Fringed Beetle: How To Control It With Insecticides, How To Prevent Its Spread, and Farmers' Bulletin 2004, Controlling the Japanese Beetle.

Weeds

Dodder has been the most troublesome weed in lespedeza. If the crop of lespedeza is used for pasturage or hay, the presence of dodder is not serious. In a seed crop, dodder not only reduces yields but also makes the seed unmarketable or salable only at a reduced price. Dodder can be eradicated from a field by burning it, spraying it, or cutting and removing it. Fields that are pastured heavily or are cut for hay have relatively little dodder.

Other weeds in lespedeza are objectionable because they reduce

the quality of hay and pasturage, and it is often difficult to separate weed seed from the lespedeza seed. Many weeds are eliminated by planting lespedeza after a clean-cultivated crop or by seeding lespedeza with small grain.

Diseases³

Bacterial wilt

The bacterial wilt disease is generally distributed wherever lespedeza is grown. It has been studied most extensively in Missouri, where reductions of 30 to 50 percent in forage yield have been recorded.

Bacterial wilt occurs principally in strains of annual lespedeza. The causal bacteria are carried in or on the seeds. They can also persist from one season to the next in diseased stems and leaves. The bacteria are disseminated by wind and rain and possibly by grazing and mowing. They gain entrance to plants through wounds in the stems and leaves.

Early infection occurs as dark, water-soaked spots on the leaves. The infected leaves soon become grayish brown, dry, and curled. The bacteria then spread to the water-conducting tissues, which they fill, and the plants wilt and die. Sometimes only individual stems are affected and killed. Since the bacteria are seed borne, only disease-free seed should be planted. Some strains are more tolerant to the disease than others; however, no resistant varieties are available.

Powdery mildew

This disease is caused by a fungus, and it occurs wherever

³ Prepared by K. W. Kreitlow, research pathologist, Crops Research Division, Agricultural Research Service.

lespedeza is grown. It usually develops late in the season, but it may cause some premature defoliation.

The mildew fungus overwinters on old leaves and stems. Spores are blown to new leaves, where they start infection. When abundant infection occurs, the leaves turn whitish. If the infection is light, diseased leaves develop whitish patches on the upper surface; they look as if they had been dusted with lime or flour.

The disease can be controlled by planting Rowan, which has some resistance.

Tar spot

This disease, caused by a fungus that is known to occur on many of the native perennial species, occurs occasionally on annual lespedezas.

Tar spot has become increasingly prevalent on some of the cultivated annuals. Sporadic outbreaks have caused severe loss of leaves.

Spots on leaves are black and may be slightly raised. They are generally 1 mm. or more in diameter. Some of the spots are round and others are somewhat elongated. When several spots occur on a leaf, the leaf usually turns yellow and drops off.

Strains of lespedeza differ in susceptibility to the disease but no resistant varieties are available. Crop rotation is a helpful control measure.

Root knot

Nematodes that cause root knot occur on many crops throughout the southeastern United States. Infection is usually more abundant in sandy soils.

The nematodes are most active and cause the greatest damage

during warm weather. They produce galls, or swellings, on roots of affected plants. Many diseased plants die during periods of drought—the root systems cannot function properly. Surviving plants are severely stunted and yellowed.

Damage from two widespread forms of root knot in the South can be reduced by planting the variety Rowan. In addition, rotation with nonsusceptible crops aids in keeping root knot under control.

Southern blight

The fungus that causes southern blight is prevalent throughout the southern lespedeza range. The disease usually occurs in isolated patches and is most active in June, July, and August, when the soil is warm. The threadlike strands of the fungus can spread and attack plants when the soil is extremely dry.

Seedlings are sometimes attacked and killed. At other times, the infection does not become evident until the plants are older or are undergoing stress such as that resulting from drought.

Usually the roots and the lower part of the stem are decayed, and the fungus frequently forms small, white, round sclerotia on the lesions.

No varieties are resistant. Rotation and good seedbed preparation help to control the disease.

Miscellaneous root rots

Occasionally areas will be found in a field in which wilting, dying, or dead plants appear. Several different kinds of fungi can be isolated from the roots of the diseased plants. Very little is known concerning the causal agents responsible for the miscellaneous root rots, and no resistant varieties are known.